WRITTEN AMENDMENTS

(Amended under the provision of Article 11)

To Mr. Masaaki Moriuchi, JPO Commissioner

1. Display of International Application
PCT/JP2004/009259

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4. Sections to be Amended
Claims

5. Content of Amendments
(1) As per the appended pages, "wherein the rear lens group has an aperture stop that is eccentric with respect to an optical axis common to the

front lens group and the rear lens group" in Claim 1 is amended to "wherein an optical path bending means is provided between the front lens group and the rear lens group, the rear lens group has an aperture stop that is eccentric with respect to an optical axis common to the front lens group and the rear lens group, the aperture stop is eccentrically displaced within a plane containing the optical axes upstream and downstream of the optical path bending means and in a direction toward the front lens group," and also Claims 4 and 6 are cancelled.

(2) As per the appended pages, "according to claim 4, wherein the aperture stop is eccentrically displaced in a direction parallel to a plane containing the optical axes upstream and downstream of the optical path bending means" in Claim 5 is amended to "according to claim 1, wherein the aperture stop is eccentrically displaced in a direction that is parallel to a plane containing the optical axes upstream and downstream of the optical path bending means and that is perpendicular to the optical axis of the rear lens group."

(3) Moreover, "according to claim 4" in Claims 7 and 20 is amended to "according to claim 1."

(4) As per the appended pages, "according to any one of claims 1 to 22" in Claim 23 is amended to "according to any one of claims 1 to 3, 5, and 7 to 22."

6. List of Appended Documents

Pages 49, 49/1, 52, and 53 of the claims[1]

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[1] Translators note. These correspond to pages 57, 58, 58/1, 61, and 62 of the English translation.

CLAIMS

1. (Amended) A projection lens for magnifying and projecting an optical image formed on a spatial light modulator onto a screen, comprising:

a front lens group and a rear lens group that are arranged in this order from the screen side toward an image plane side,

wherein an optical path bending means is provided between the front lens group and the rear lens group,

the rear lens group has an aperture stop that is eccentric with respect to an optical axis common to the front lens group and the rear lens group,

the aperture stop is eccentrically displaced within a plane containing the optical axes upstream and downstream of the optical path bending means and in a direction toward the front lens group, and

focus adjustment is performed by moving the rear lens group in a direction of the optical axis without rotating the rear lens group.

2. The projection lens according to claim 1, wherein magnification adjustment is performed by moving the front lens group in the direction of the optical axis.

3. The projection lens according to claim 1, further comprising an auxiliary lens group between the rear lens group and the image plane.

4. (Cancelled)

5. (Amended) The projection lens according to claim 1, wherein the aperture stop is eccentrically displaced in a direction that is parallel to a plane containing the optical axes upstream and downstream of the optical path bending means and that is perpendicular to the optical axis of the rear lens group.

6. (Cancelled)

7. (Amended) The projection lens according to claim 1, wherein when an angle between the optical axes upstream and downstream of the optical path bending means is θ, the following relationship is satisfied:

$$45° \leq \theta \leq 90° \qquad (13)$$

8. The projection lens according to claim 1, wherein the aperture stop has an opening having a substantially elliptical shape.

9. The projection lens according to claim 8, wherein when an amount of eccentricity of the aperture stop is D1 and an effective aperture radius in a position of the aperture stop is D2, the following condition is satisfied:

$$D1/D2 < 0.5 \qquad (12)$$

10. The projection lens according to claim 1, wherein an effective display area of the spatial light modulator has a rectangular shape having a long axis and a short axis, and the aperture stop is eccentrically displaced in a direction along the long axis or a direction along the short axis.

11. The projection lens according to claim 3,

wherein the front lens group comprises a first lens group having a negative power,

the rear lens group comprises a second lens group having a positive power and a third lens group having a positive power that are arranged in this order from the screen side,

the auxiliary lens group comprises a fourth lens group having a

positive power,

and when an axial air gap between the first lens group and the second lens group is t12, an axial air gap between the third lens group and the

lens group is f2, and a focal length of the third lens group is f3, the following conditions are satisfied:

$$-2.9 < f1/f < -2.1 \quad (5)$$

$$7.3 < f2/f < 14.5 \quad (6)$$

$$5.7 < f3/f < 7.5 \quad (7)$$

20. (Amended) The projection lens according to claim 1, wherein the optical path bending means is a dielectric multilayer mirror.

21. The projection lens according to claim 13, wherein when an Abbe number and a refractive index of the positive lens constituting the cemented lens included in the second lens group are respectively $\nu 2p$ and n2p, and an Abbe number and a refractive index of the negative lens constituting the cemented lens included in the second lens group are respectively $\nu 2n$ and n2n, the following conditions are satisfied:

$$\nu 2p < \nu 2n \quad (8)$$

$$n2p < n2n \quad (9)$$

22. The projection lens according to claim 13 or 14, wherein when an Abbe number and a refractive index of the positive lens constituting the cemented lens included in the third lens group are respectively $\nu 3p$ and n3p, and an Abbe number and a refractive index of the negative lens constituting the cemented lens included in the third lens group are respectively $\nu 3n$ and n3n, the following conditions are satisfied:

$$\nu 3p > \nu 3n \quad (10)$$

$$n3p < n3n \quad (11)$$

23. (Amended) A projection display apparatus, comprising:

a spatial light modulator for forming an optical image according to a video signal,

an illuminating means for illuminating the spatial light modulator, and

a projection lens for projecting the optical image formed on the spatial light modulator onto a screen,

wherein the projection lens according to any one of claims 1 to 3, 5, and 7 to 22 is used as the projection lens.

24. The projection display apparatus according to claim 23, wherein the spatial light modulator is a DMD (Digital Micro-Mirror Device) comprising a two-dimensional array of a plurality of microscopic mirrors.

25. The projection display apparatus according to claim 23, further comprising a field stop on the screen side of the projection lens.

26. The projection display apparatus according to claim 23, wherein the illuminating means forms an illumination light that is switched between three primary colors, red (R), green (G), and blue (B), of light with time, and the spatial light modulator displays the optical images corresponding to the three primary colors of light while switching the optical images with time.

27. A rear projection display apparatus, comprising:

a projection display apparatus, and

a transmission-type screen for displaying an image projected from the projection display apparatus,

wherein the projection display apparatus according to any one of claims 23 to 26 is used as the projection display apparatus.